

WHAT IS CLAIMED IS:

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1. An image pickup apparatus comprising:  
a plurality of pixels; and  
a color filter array of four colors disposed on  
5 said plurality of pixels,  
wherein said color filter array has a periodicity  
of two rows  $\times$  two columns, and colors of four color  
filters in a periodical unit of two rows  $\times$  two columns  
are all different from each other.  
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2. An image pickup apparatus according to claim  
1, wherein the four color filters include a filter of  
transmitting only green light in a visible light range,  
a filter of intercepting only blue color in the visible  
15 light range, a filter of intercepting only green light  
in the visible light range, and a filter of  
intercepting only red light in the visible light range.
3. An image pickup apparatus according to claim  
20 1, further comprising means for performing an operation  
of  $A + B - C - D$ , where A, B, C, and D represent  
signals picked up from an area of two rows  $\times$  two  
columns.
- 25 4. An image pickup apparatus according to claim  
3, wherein the signals A and B are disposed on a same  
line or on a same column, and the signals C and D are

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disposed on a same line or on a same column.

5        5. An image pickup apparatus according to claim  
3, further comprising means for performing an operation  
of  $A + C - B - D$ .

10       6. An image pickup apparatus according to claim  
5, wherein the signals A and B are disposed on a same  
line or on a same column, and the signals C and D are  
disposed on a same line or on a same column.

15       7. An image pickup apparatus according to claim  
1, further comprising means for reading a difference  
between an addition signal of a first row, first column  
signal and a first row, second column signal and an  
addition signal of a second row, first column signal  
and a second row, second column signal, respectively in  
an area of two rows  $\times$  two columns column, and means for  
reading a difference between an addition signal of a  
20       first row, first column signal and a second row, first  
column signal and an addition signal of a first row,  
second column signal and a second row, second column  
signal, respectively in the area of two rows  $\times$  two  
columns column.

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8. An image pickup apparatus according to claim  
7, wherein the areas of two rows  $\times$  two columns are

disposed without any space therebetween.

9. An image pickup apparatus according to claim  
1, further comprising means for reading an addition  
5 signal of all signals in an area of four rows x one  
column.

10. An image pickup apparatus according to claim  
1, further comprising means for reading an addition  
10 signal of all signals in an area of one row x four  
columns.

11. An image pickup apparatus comprising:  
a plurality of pixels;  
15 a color filter array of four colors disposed on  
said plurality of pixels and having a periodicity of  
two rows x two columns; and  
calculating means for calculating two color  
difference signals from each color filter of two rows x  
20 two columns in said color filter array having the  
periodicity of two rows x two columns.

12. An image pickup apparatus according to claim  
11, wherein said calculating means performs an  
25 operation of  $A + B - C - D$ , where A, B, C, and D  
represent signals picked up from an area of two rows x  
two columns.

13. An image pickup apparatus according to claim 12, wherein the signals A and B are disposed on a same line or on a same column and the signals C and D are disposed on a same line or on a same column.

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14. An image signal read method of reading an image signal from the image pickup apparatus recited in claim 1, wherein an image signal is read by performing an operation of  $A + B - C - D$ , where A, B, C, and D represent signals picked up from an area of two rows  $\times$  two columns.

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15. An image signal read method according to claim 14, wherein the signals A and B are disposed on a same line or on a same column, and the signals C and D are disposed on a same line or on a same column.

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16. An image signal read method according to claim 14, wherein an image signal is read by performing an operation of  $A + C - B - D$ .

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17. An image signal read method according to claim 16, wherein the signals A and B are disposed on a same line or on a same column, and the signals C and D are disposed on a same line or on a same column.

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18. An image signal read method of reading an

image signal from the image pickup apparatus recited in claim 1, wherein a difference between an addition signal of a first row, first column signal and a first row, second column signal and an addition signal of a second row, first column signal and a second row, second column signal, respectively in an area of two rows x two columns column, is read as a first color difference signal, and a difference between an addition signal of a first row, first column signal and a second row, first column signal and an addition signal of a first row, second column signal and a second row, second column signal, respectively in the area of two rows x two columns column, is read as a second color difference signal.

19. An image signal read method according to claim 15, wherein the areas of two rows x two columns are disposed without any space therebetween.

20. An image signal read method of reading an image signal from the image pickup apparatus recited in claim 1, wherein an addition signal of all signals in an area of four rows x two columns is read as a luminance signal.

21. An image signal read method of reading an image signal from the image pickup apparatus recited in

claim 1, wherein an addition signal of all signals in an area of two rows  $\times$  four columns is read as a luminance signal.

- 5           22. An image pickup apparatus comprising:  
a plurality of pixels;  
a color filter array of four colors disposed on  
said plurality of pixels;

10           first calculating means for calculating a  
difference between an average signal of a first row,  
first column signal and a first row, second column  
signal in an area of two rows  $\times$  two columns and an  
average signal of a second row, first column signal and  
a second row, second column signal in the area of two  
15 rows  $\times$  two columns; and

          second calculating means for calculating a  
difference between an average signal of a first row,  
first column signal and a second row, first column  
signal in the area of two rows  $\times$  two columns and an  
20 average signal of a first row, second column signal and  
a second row, second column signal in the area of two  
rows  $\times$  two columns.

- 25           23. An image pickup apparatus according to claim  
22, wherein:

          said first calculating means comprises first  
storing means for storing the first row, first column

signal, second storing means for storing the first row,  
second column signal, third storing means for storing  
the second row, first column signal, fourth storing  
means for storing the second row, second column signal,  
5 first averaging means for averaging the signals stored  
in said first and second storage means, second  
averaging means for averaging the signals stored in  
said third and fourth storage means, and first  
difference calculating means for calculating a  
10 difference between an averaged signal of the signals  
stored in said first and second storage means and an  
averaged signal of the signals stored in said third and  
fourth storage means; and  
said second calculating means comprises fifth  
15 storing means for storing the first row, first column  
signal, sixth storing means for storing the second row,  
first column signal, seventh storing means for storing  
the first row, second column signal, eighth storing  
means for storing the second row, second column signal,  
20 third averaging means for averaging the signals stored  
in said third and fourth storage means, fourth  
averaging means for averaging the signals stored in  
said fifth and sixth storage means, and second  
difference calculating means for calculating a  
25 difference between an averaged signal of the signals  
stored in said fifth and sixth storage means and an  
averaged signal of the signals stored in said seventh

and eighth storage means.

24. An image signal processing apparatus for the  
image pickup apparatus recited in claim 1, comprising  
5 means for performing an operation of  $A + B - C - D$ ,  
where A, B, C, and D represent signals picked up from  
an area of two rows  $\times$  two columns.

25. An image signal processing apparatus  
10 according to claim 24, wherein the signals A and B are  
disposed on a same line or on a same column, and the  
signals C and D are disposed on a same line or on a  
same column.

26. An image signal processing apparatus  
15 according to claim 24, further comprising means for  
performing an operation of  $A + C - B - D$ .

27. An image signal processing apparatus  
20 according to claim 26, wherein the signals A and B are  
disposed on a same line or on a same column, and the  
signals C and D are disposed on a same line or on a  
same column.

28. An image signal processing method for the  
25 image pickup apparatus recited in claim 1, comprising a  
step of performing an operation of  $A + B - C - D$ , where



A, B, C, and D represent signals picked up from an area of two rows  $\times$  two columns.

5 29. An image signal processing method according to claim 28, wherein the signals A and B are disposed on a same line or on a same column, and the signals C and D are disposed on a same line or on a same column.

10 30. An image signal processing method according to claim 28, comprising a step of performing an operation of  $A + C - B - D$ .

15 31. An image signal processing method according to claim 30, wherein the signals A and B are disposed on a same line or on a same column, and the signals C and D are disposed on a same line or on a same column.

20 32. A computer readable storage medium storing a program for the image pickup apparatus recited in claim 1, wherein the program performs an operation of  $A + B - C - D$ , where A, B, C, and D represent signals picked up from an area of two rows  $\times$  two columns.

25 33. A computer readable storage medium according to claim 32, wherein the signals A and B are disposed on a same line or on a same column, and the signals C and D are disposed on a same line or on a same column.

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5            35. A computer readable storage medium according to claim 34, wherein the signals A and B are disposed on a same line or on a same column, and the signals C and D are disposed on a same line or on a same column.

10            36. An image pickup system comprising the image pickup apparatus recited in claim 1 and the image signal processing apparatus recited in claim 24.

37. An image pickup system comprising the image  
15 pickup apparatus recited in claim 1 and the image  
signal processing apparatus recited in claim 26.